

is developed to its fullest power. It will be almost the biggest generating station in the world when completed. Eight engines will work up to 52,000 horse-power, and the electricity generated will be sufficient to work the whole of the London tramway system. At the present time the Astronomer Royal said that no serious effect has as yet arisen in the working of the principal meridian instrument. The Astronomer Royal, however, says that the instrument which has been affected is the portable transit instrument used for determining longitude. From the large generating station at Deptford no damage has resulted, and there is no indication of any disturbance. What the authorities have to do is to take very careful observation as to what is exactly going on at Greenwich. At present the station is never worked up to more than 3000 horse-power. A trial has been made of two engines, but the experiments are neither complete nor satisfactory. It is proposed to ask Prof. Ewing to represent the Admiralty in the observations to be taken, which must extend over a considerable time. The disturbances vary very much, and there is a great deal to be said as to the possibility of meeting the difficulties by reducing the high chimneys, though the Astronomer Royal does not think that the vapour of the chimneys seriously interferes with the observations. It is proposed also to ask the County Council to appoint a representative of its own for observation in order to have an independent report as to the exact amount of disturbance that might arise. The London County Council will not go on with the two chimneys, which are now only partly erected. Before doing anything it is necessary to discover whether by any re-arrangement of the machinery the threatened damage can be averted. Every effort will be made to make the inquiry a thorough one, and one which should command everyone's respect.

The position then, as stated by Viscount Goschen, is that a mistake has been made—a mistake by the Admiralty, by the Astronomer Royal, by the County Council, and by Parliament. The matter affects, not only the Royal Observatory, but the whole world; and the best scientific knowledge available should be utilised to avert any danger which imperils the useful existence of the observatory or interferes with its work.

### THE SEA-SERPENT.

THE narrative of an encounter with the "sea-serpent" on December last off the coast of Para, given by Messrs. Nicoll and Meade-Waldo at the meeting of the Zoological Society held on June 19, has once more awakened interest in the question as to the possibility of the existence of a large unknown marine vertebrate animal. The appearance of the so-called "sea-serpent" has been recorded from time to time by quite a number of witnesses. Many of these alleged appearances were evidently based on objects other than vertebrate animals unknown to science, but others, as being witnessed by trustworthy and educated observers, are evidently worthy of more serious consideration. The importance of the recent case—of which more anon—is that it was witnessed by two gentlemen who have undergone a long training in the observation of animals, and are therefore far less likely to be mistaken than persons who have not specially devoted themselves to the study of natural history.

To attempt to record on the present occasion all the trustworthy cases of the alleged appearance of the sea-serpent (for the sake of convenience we may discard the inverted commas) would much exceed our limits of space, and we may therefore refer our readers to the volume by Mr. A. C. Oudemans entitled the "Great Sea Serpent," published in 1892, where all the more important ones up to that date will be found mentioned. It may be profitable to

refer, however, to a few of the published opinions of naturalists on the sea-serpent question. In his *Challenger* book, the late Prof. H. N. Moseley wrote as follows:—

"The sea-serpent, however, is always open to criticism. This wonderful animal has hardly ever been seen alike by any two observers. It is nearly always easy to a naturalist to understand the stories told. Sometimes it is a pair of whales that is seen; sometimes a long mass of floating seaweed deceives the distant observer; sometimes the serpent has large eyes and a crest behind the head; then it is a ribbon-fish. I myself am one of the few professed naturalists who have seen the serpent. It was on a voyage to Rotterdam from the Thames. . . . It was a flock of cormorants, which were flying in line behind the waves, and which were viewed in the intervals between them with a sort of thaumoscopic effect."

Clearly Mr. Moseley was not "on the side of the angels"; neither was Sir Richard Owen, who attempted to explain the undermentioned appearance seen by the officers of the *Dædalus* by the seaweed theory; and that some of the appearances can be explained by Moseley's suggestions, or by a school of porpoises, may be candidly admitted.

Mr. F. A. Lucas, on the other hand, in his "Animals of the Past," although confessing himself an "agnostic" in regard to this subject, takes up a somewhat less uncompromisingly hostile attitude.

"Like the 'fossil man,'" he writes, "the sea-serpent flourishes perennially in the newspapers, and despite the fact that he is now mainly regarded as a joke, there have been many attempts to rehabilitate this mythical monster and place him on a foundation of firm fact. The most earnest of these was that of M. Oudemans, who expressed his belief in the existence of some rare and huge seal-like creature whose occasional appearance gave rise to the reports of the sea-serpent. Among other possibilities it has been suggested that some animal believed to be extinct had really lived to the present day. Now there are a few waifs, spared from the wrecks of ancient faunas, stranded on the shores of the present, such as the Australian *ceratodus* and the gar-pikes of North America. . . . If a fish of such ancient lineage as the gar-pike is so common, why may there not be a few plesiosaurs or a mosasaur in the depths of the ocean? The argument was a good one, the more that we may 'suppose' almost anything; but it must be said that no trace of any of these creatures has so far been found outside of the strata in which they have long been known to occur, and all the probabilities are opposed to this theory."

The event recorded by Messrs. Nicoll and Meade-Waldo took place in the forenoon of December 7, 1905, when they were on board the yacht *Valhalla* off the coast of Para. At a distance of about 100 yards from the vessel the two observers saw what appeared to be the vertical dorsal fin of some large animal, and a short time afterwards the head and neck of an animal was raised above the water some distance in advance of the fin. The head was compared to that of a turtle, while the neck appeared to be about 6 feet in length. The description, so far as we can judge, suggests a creature of not more than about 20 feet or 25 feet in length. Although the vessel was subsequently put about, no further signs of the sea-serpent were seen during daylight. It is, however, noteworthy that during the night two of the ship's officers became aware of the presence of some large animal swimming alongside the yacht at a rapid pace; the two officers, it is stated, had no cognisance of the events of the morning.

A most significant feature in this circumstantial account is that it tallies to some extent with the narrative given by the officers of H.M.S. *Daedalus* of the appearance of the sea-serpent seen by them in the year 1848 in the Atlantic.

In the figures given by Oudemans the (double) back-fin is very low, and the neck seems relatively short and ill-defined. Revised restorations, however, give a longer neck and no back-fin. It is possible, if a fin was present, that its apparent difference in height in the two instances was due to the animal swimming faster in one case than the other. *Megophias megophias*, it appears, is a name which has been suggested for the creature. In 1903 Prof. Racovitza (Bull. Soc. Zool. Paris, xxviii., p. 11) gave an account of a sea-serpent seen by Lieut. Lagresille in 1898 in Along Bay, Tonkin, and in 1904 M. Vaillant (Bull. Mus. Paris, x., p. 217) mentioned another apparition of an apparently similar creature in the same locality. In this second account the animal is described as being probably scaled, with a head like that of a turtle or a seal, and as "spouting" from terminally placed nostrils. It was also stated to move in undulations—at one time vertical, at another horizontal. Two occurrences in the same locality are very noteworthy.

In each of these four instances it can scarcely be doubted that the object seen was a living creature (or creatures) of some kind, and that it (or they) was of the same general type. If the object were formed by more than one animal, *cadit quaestio*. If, on the other hand, it consisted of a single individual, furnished with a dorsal fin, a long, snake-like neck, and a head like a turtle, it could scarcely be any known living animal. Neither, it may be suggested, could it be even an unknown type of seal, especially since all the known members of that group come ashore to breed. The next question is, Could it have been a survivor of some Mesozoic reptilian? Two arguments, so far as they go, are against this. Firstly, the one referred to by Mr. True as to the absence of the remains of any such creature in Tertiary deposits, and secondly (on the hypothesis that it is an air-breathing vertebrate, and if not, why should it come to the surface at all?), the rarity of the sea-serpent's appearance, the latter argument being applicable whether the creature is considered to belong to a supposed extinct group or not.

With regard to the fossil theory, it might be urged that the creature is an inhabitant of the deep sea, and consequently that its remains should not be expected to occur in Tertiary deposits, which belong for the most part, at any rate, to more or less shallow water. For what it is worth, it may be mentioned in reply that no traces of the creature have been found on the ocean bottom, where sharks' teeth and cetacean ear-bones are common. A more forcible objection is that, if the creature is in the habit of coming to the surface (as on the hypothesis of its existence it must), it cannot be a denizen of the abysses, no animal (despite the old belief in regard to whales) being able to live under such diversities of pressure. *Ergo*, its remains ought to occur in Tertiary deposits. Its stranded carcass ought also to have been found. If the creature be a "living fossil," the plesiosaurian group has the strongest claim to its ownership, as, although the Zeuglodont cetaceans are the latest in time of possible extinct representatives, the smallness of its head prevents the reference of the sea-serpent (as described) to that group. As to the rarity of its appearance, it can scarcely be urged that only two or three (or even half a dozen) examples of the creature are in existence.

Without offering any suggestion as to what the nature of the object seen by Messrs. Nicoll and Meade-Waldo really was, it may be pointed out that the testimony of two such trained observers (supplemented by that of the officers of the *Daedalus* and by the two "apparitions" off Tonkin) cannot possibly be brushed aside in the light-hearted manner with which Prof. Moseley treated the evidence available in his time.

R. L.

#### THE ROYAL SOCIETY CONVERSAZIONE.

MANY of the exhibits of scientific apparatus and objects at the second, or ladies', conversazione held at the Royal Society on June 20 were the same as those shown at the gentlemen's conversazione on May 9. As these have already been described (May 17, p. 59), it is only necessary to refer now to the new exhibits. During the evening demonstrations, with lantern illustrations, were given by Dr. Tempest Anderson, Sir William Crookes, and Mr. Fred. Enock. Dr. Tempest Anderson described the recent eruption of Vesuvius, his photographs showing the phenomena during the later stages of the eruption, as well as some of the results. In several cases the views afforded a comparison with the conditions of the same places as previously observed. Sir William Crookes gave a short address with experiments in illustration of some properties of the diamond; and Mr. Fred. Enock described slides showing by means of colour photography (Sanger Shepherd process) the adaptability of lepidopterous insects to their environment.

In the subjoined summary of the official catalogue, the exhibits are arranged roughly in groups of related subjects.

*Dr. H. Forster Morley on behalf of the International Catalogue Committee:* A map of the world was shown upon which thirty-one countries or regions were coloured. Each of these has established a Regional Bureau for indexing its scientific literature. The literature indexed is that published since January 1, 1901. Each annual issue of the catalogue contains seventeen volumes, dealing with seventeen sciences. A copy of the second annual issue was shown. The Regional Bureaus for France, Germany, and that for Polish literature employ the material prepared for the International Catalogue for the compilation of bibliographies of their own scientific literature. Specimens of these bibliographies were shown.—*Prof. H. McLeod on behalf of the Committee of the Royal Society's Catalogue of Scientific Papers:* An exhibit illustrating the course of operations in the preparation of the catalogue, which was fully described in an appendix to the descriptive programme of the conversazione.

*Sir James Dewar, F.R.S.:* (1) New charcoal calorimeter and thermoscope. Charcoal at the temperature of liquid hydrogen that has absorbed at atmospheric pressure considerable quantities of helium or hydrogen—or alternatively of nitrogen, oxygen, or air at their respective boiling points—is utilised in this instrument as a material that, by reason of changes in the volume of the occluded gas, exhibits great sensibility to heat and light radiation, and can be used in calorimetry at the temperature of solid hydrogen. (2) Charcoal vacua. Electric discharge tubes showing gradual gas absorption by charcoal cooled in liquid air until, after the Röntgen radiation stage, the electric resistance becomes so great that a discharge will not pass. (3) Spectrum tubes. (a) The less condensable gases of the atmosphere—helium and neon. (b) The more condensable gases of the atmosphere—krypton and xenon, each set of gases being separated by the charcoal method. (4) Some scientific uses of liquid air. (a) Electric ice crystals. (b) Rough measures of relative thermal conductivities in metals and alloys, by observing the height of the deposited ice cap when similar wires are placed alongside each other.